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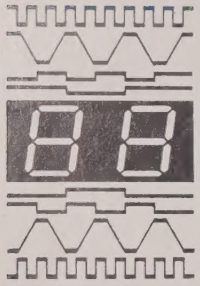

Frequency Counters
PM 6661 and PM 6664

Ordering number of this manual 9499 460 09802

Printing date 780815

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Instruction Manual

Frequency Counters

PM 6661 and PM 6664

Ordering number of this manual 9499 460 09802

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IMPORTANT

In correspondence concerning this instrument, please quote the type number and the serial number as given on the type plate of the instrument.

WICHTIG

Bei Schriftwechsel dieses Gerät betreffend, bitte die auf dem Typenschild angegebene Typ- und Seriennummer zu vermelden.

IMPORTANT

Dans votre correspondance et dans vos réclamations se rapportant a cet appareil, veuillez toujours indiquer le numéro de type et le numéro de série qui sont marqués sur la plaquette signalétique.

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N.V. PHILIPS' GLOEILAMPENFABRIKEN – EINDHOVEN – THE NETHERLANDS – 1978

Printed in Sweden/AB Irkå Tryck

1. Introduction

The PM 6661 and PM 6664 are 8 digits frequency counters with automatic triggering and input attenuation.
The sensitivity is 20 mV_{rms} and the frequency range is 10 Hz to 80 MHz for the PM 6661 and 10 Hz to 520 MHz for the PM 6664.
The design of the instruments is subject to continuous development and improvement. Consequently, the instruments may incorporate minor changes in detail from the information contained in this manual.

2. Technical data

2.1. Measurement PM 6661

Frequency range: 10 Hz to 80 MHz
Gate time: 1 s
Resolution: 1 Hz
Input impedance: 1 MΩ//18 pF
Coupling: ac
AM tolerance: 30 %
Accuracy: ± 1 digit ± time base error
Maximum input voltage without damage: 260 V_{rms} at 10 Hz and 12 V_{rms} at 80 MHz. See also graph in section 3
Input attenuation: automatically and continuously variable from ×1 to ×50
Sensitivity: 20 mV_{rms}. See also graph in section 3

2.2. Measurement PM 6664

Frequency range: 10 Hz to 520 MHz
Gate time: 1 s
Resolution: 1 Hz for frequencies up to approximately 70 MHz and 10 Hz for frequencies above 70 MHz
Input impedance: 1 MΩ//25 pF. See also the graph in section 13
Sensitivity: 20 mV_{rms}. See also graph in section 3
Coupling: ac
AM tolerance: 30 % from 10 Hz to prescaler switch on frequency. 95 % from prescaler switch on frequency to 520 MHz at a f_{mod} of 5 kHz or less
Accuracy: ± 1 digit ± time base error
Maximum input voltage vithout damage: 260 V_{rms} at 10 Hz and 12 V_{rms} at 520 MHz. See also the graph in section 3
Input attenuation: automatically and continuously variable from ×1 to ×50
Prescaler switch over: on at approximately 70 MHz and off at approximately 60 MHz

2.3. Time base characteristics PM 6661

Frequency: 2^{22} Hz
Ageing: less than 2×10^{-6}/year
Temperature stability 0°C...50°C: less than 1.5×10^{-5} with reference to 25°C

2.4. Time base characteristics PM 6664/01

Frequency: 2^{22} Hz
Ageing: less than 2×10^{-6}/year
Temperature stability 0°C...50°C: less than 1.5×10^{-5} with reference to 25°C

2.5. Time base characteristics PM 6664/02

Frequency: 2^{23} Hz
Ageing: less than 1×10^{-7}/month
Temperature stability 0°C...50°C: less than 1×10^{-6} with reference to + 25°C

2.6. Environmental characteristics

Storage temperature: — 40°C... + 70°C
Operating temperature: 0°C...+ 45°C
Storage altitude: 15.000 m (15.2 kN/m²)
Operating altitude: 5.000 m (53.3 kN/m²)
Humidity: 10 %...90 % RH (26°C dew point)
Vibration: according to IEC 68 Fc
Bump: according to IEC 68 Eb
Handling: according to IEC 68 Ec
Transport: according to NLN-L88
Width: 145 mm
Height: 45 mm
Depth: 220 mm
Weight PM 6661: 1400 g
Weight PM 6664: 1500 g

3. Performance check

3.1. Frequency check

— Connect the signal from TP9 to the input socket of the counter via a 10 MΩ//11 pF probe.
— Check that counter displays 4.194304 MHz ± 1 Hz.

20 mV

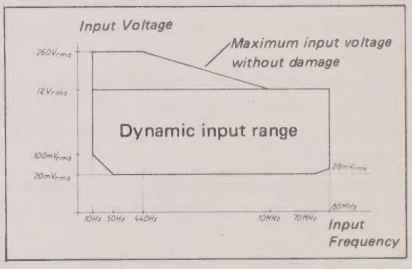
3.2. Sensitivity check PM 6661

— Connect signal source output to the input socket of the counter via a 50Ω feedthru resistor.
— Vary signal frequency from 50 Hz to 70 MHz. Counter should display the input frequency correctly at an input level of 20 mV_{rms}.
— Set the signal source to 10 Hz and check that the counter displays the input frequency correctly at an input level of 100 mV_{rms}.
— Set the signal source to 80 MHz and check that the counter displays the input frequency correctly at an input level of 28 mV_{rms}.

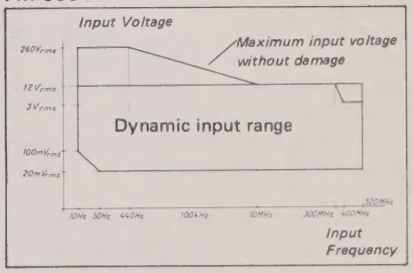
3.3. Sensitivity check PM 6664

— Connect signal source output to the input socket of the counter via a 50Ω feedthru resistor.
— Vary signal frequency from 50 Hz to 520 MHz. Counter should display the input frequency correctly at an input level of 20 mV_{rms}.
— Set the signal source to 10 Hz and check that the counter displays the input frequency correctly at an input level of 100 mV_{rms}.

PM 6661



PM 6664



4. Accessories

4.1. Standard accessoires supplied with the instrument

1 mains cable and 1 manual

4.2. Accessories to be ordered separately

PM 9665 B: 50 kHz low pass filter
PM 9669/09: panel mount adapter
PM 9585: 50Ω/1 W feed-through termination

1. Einleitung

Die Modelle PM 6661 und PM 6664 sind achtstellige Frequenzzähler mit automatischer Triggerung und Eingangsabschwächung. Sie ermöglichen Frequenzmessungen im Bereich von 10 Hz bis 80 MHz (PM 6661) bzw. von 10 Hz bis 520 MHz (PM 6664). Die Empfindlichkeit beträgt 20 mV_{eff}.
Konstruktion und Schaltung dieser Geräte werden ständig weiterentwickelt und verbessert. Sie können daher geringfügig von den Angaben in dieser Bedienungsanleitung abweichen.

2. Technische Daten

2.1. Messungen PM 6661

Frequenzbereich: 10 Hz bis 80 MHz
Meßzeit: 1 s
Auflösung: 1 Hz
Eingangsimpedanz: 1 MΩ/18 pF
Kopplung: AC
AM-Toleranz: 30 %
Genauigkeit: ± 1 digit ± Zeitbasisfehler
Max. zulässige Eingangsspannung: 260 V_{eff} bei 10 Hz und 12 V_{eff} bei 80 MHz (siehe auch Diagramm in Abschnitt 3)
Eingangsabschwächung: automatisch und stufenlos einstellbar von ×1 bis ×50
Empfindlichkeit: 20 mV_{eff} (siehe auch Diagramm in Abschnitt 3)

2.2. Messungen PM 6664

Frequenzbereich: 10 Hz bis 520 MHz
Meßzeit: 1 s
Auflösung: 10 Hz bis ca 70MHz und 1 Hz von ca 70 MHz bis 520 MHz.
Eingangsimpedanz: 1 MΩ/25 pF (siehe auch Diagramm in Abschnitt 13
Empfindlichkeit: 20 mV_{eff} (siehe auch Diagramm in Abschnitt 3)
Kopplung: AC
AM-Toleranz: 30 % zwischen 10 Hz und ca. 70 MHz (Vorteiler-Einschaltung).
95 % zwischen ca. 70 MHz (Vorteiler-Einschaltung) und 520 MHz bei f_{mod} = max. 5 kHz
Genauigkeit: ± 1 digit ± Zeitbasisfehler
Max. zulässige Eingangsspannung: 260 V_{eff} bei 10 Hz und 12 V_{eff} bei 520 MHz (siehe auch Diagramm in Abschnitt 3)
Eingangsabschwächung: automatisch und stufenlos einstellbar von × 1 bis × 50
Vorteiler-Umschaltung: Einschaltung bei ca. 70 MHz und Abschaltung bei ca. 60 MHz

2.3. Zeitbasis-Kenndaten PM 6661

Frequenz: 2^{22} Hz
Alterung: unter 2×10^{-6} pro Jahr
Temperaturabweichung 0°C bis 50°C: unter $1{,}5 \times 10^{-5}$ bezogen auf 25°C

2.4. Zeitbasis-Kenndaten PM 6664/01

Frequenz: 2^{22} Hz
Alterung: unter 2×10^{-6} pro Jahr
Temperaturabweichung 0°C bis 50°C: unter $1{,}5 \times 10^{-5}$ bezogen auf 25°C

2.5. Zeitbasis-Kenndaten PM 6664/02

Frequenz: 2^{23} Hz
Alterung: unter 1×10^{-7} pro Monat
Temperaturabweichung 0°C bis 50°C: unter 1×10^{-6} bezogen auf 25°C

2.6. Umgebungsbedingungen

Lagertemperatur: — 40°C bis + 70°C
Betriebstemperatur: 0°C bis + 45°C
Lagerhöhe: 15.000 m (15,2 kN/m²)
Betriebshöhe: 5.000 m (53,3 kN/m²)
Feuchtigkeit: 10 bis 90 % rel. Luftfeuchtigkeit (Taupunkt 26°C)
Vibrationsfestigkeit: nach IEC 68 Fc
Stoßfestigkeit: nach IEC 68 Eb
Bedienungstest: nach IEC 68 Ec
Transporttest: nach NLN-L88
Breite: 145 mm
Höhe: 45 mm
Tiefe: 220 mm
Gewicht PM 6661: 1400 g
Gewicht PM 6664: 1500 g

3. Funktionskontrolle

3.1. Frequenzprüfung

— Signal von TP9 über einen 10 MΩ/11 pF Tastkopf an die Eingangsbuchse legen.
— Kontrollieren, ob der Zähler 4.194304 MHz ± 1 Hz anzeigt.

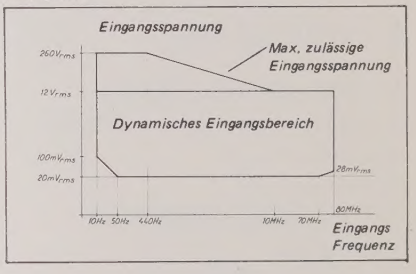
3.2. Empfindlichkeitsprüfung PM 6661

— Signalquelle über einen 50-Ω-Durchgangsabschluß an die Eingangsbuchse des Zählers legen.
— Signalfrequenz von 50 Hz bis 70 MHz varieren. Der Zähler muß die Eingangsfrequenz bei einem Eingangspegel von 20 mV_{eff} korrekt anzeigen.
— Signalquelle auf 10 Hz einstellen und kontrollieren, ob der Zähler die Eingangsfrequenz bei einem Eingangspegel von 100 mV_{eff} korrekt anzeigt.
— Signalquelle auf 80 MHz einstellen und kontrollieren, ob der Zähler die Eingangsfrequenz bei einem Eingangspegel von 28 mV_{eff} korrekt anseigt.

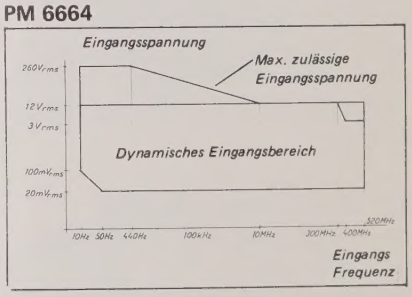
3.3. Empfindlichkeitsprüfung PM 6664

— Signalquelle über einen 50-Ω-Durchgangsabschluß an die Eingangsbuchse des Zählers legen.
— Signalfrequenz von 50 Hz bis 520 MHz varieren. Der Zähler muß die Eingangsfrequenz bei einem Eingangspegel von 20 mV_{eff} korrekt anzeigen.
— Signalquelle auf 10 Hz einstellen und kontrollieren, ob der Zähler die Eingangsfrequenz bei einem Eingangspegel von 100 mV_{eff} korrekt anzeigt.

PM 6661



PM 6664



4. Zubehör

4.1. Mitgeliefertes Standardzubehör

1 Netzkabel und 1 Bedienungsanleitung

4.2. Auf Bestellung lieferbares Zubehör

PM 9665B: 50-kHz-Tiefpassfilter
PM 9669/09: Einbau-Adapter
PM 9585: 50-Ω-Durchgangsabschluß, 1 W

1. Introduction

Les PM 6661 et PM 6664 sont des compteurs-fréquencemètres à 8 chiffres avec déclenchement automatique et atténuation d'entrée. La sensibilité est de 20 mV_{eff} et la gamme de fréquence de 10 Hz à 80 MHz pour le PM 6661, de 10 Hz à 520 MHz pour le PM 6664. Cet appareil est l'objet de développements et améliorations continuels. En conséquence, certains détails mineurs peuvent différer des informations données dans la présente notice d'emploi et d'entretien.

2. Caractéristiques techniques

2.1. Mesures PM 6661

Gamme de fréquence : 10 Hz à 80 MHz
Temps de porte : 1 s
Résolution : 1 Hz
Impedance d'entrée : 1 MΩ/18 pF
Couplage : capacitif
Tolérance AM : 30 %
Précision : ± 1 impulsion ± erreur de base de temps
Tension maximale d'entrée sans dommage : 260 V_{eff} pour 10 Hz et 12 V_{eff} pour 80 MHz (regarder aussi graphique en séction 3)
Atténuation d'entrée : Automatique et réglable de façon continue entre × 1 ... × 50
Sensibilité : 20 mV_{eff} (regarder aussi graphique en séction 3)

2.2. Mesures PM 6664

Gamme de fréquence : 10 Hz à 520 MHz
Temps de porte : 1 s
Résolution: 10 Hz pour approx. fréquences à 70 MHz et 1 Hz pour fréquences au-dessus de 70 MHz
Impedance d'entrée : I MΩ/25 pF (regarder aussi graphique en séction 9)
Sensibilité : 20 mV_{eff} (regarder aussi graphique en séction 13
Couplage : capacitif
Tolérance AM : 30 % de 10 Hz à la commutation du facteur de division (approx. 70 MHz). 95 % entre approx. 70 MHz et 520 MHz pour une fréquence de modulation ≤ 5 kHz
Précision : ± 1 impulsion ± erreur de base de temps
Tension maximale d'entrée sans dommage : 260 V_{eff} pour 10 Hz et 12 V_{eff} pour 520 Hz (regarder aussi la graphique en séction 3)
Atténuation d'entrée : Automatique et réglable de façon continue entre × 1 ... × 50
Hystérésis du changement de gamme : Commutation du facteur de division vers 70 MHz, coupure vers 60 MHz

2.3. Caractéristiques de base de temps pour PM 6661

Fréquence : 2^{22} Hz
Usure : inférieure à 2×10^{-6}/an
Déviation de température de 0°C à 50°C : inférieure à $1{,}5 \times 10^{-5}$ par rapport à + 25°C

2.4. Caractéristiques de base de temps pour PM 6664/01

Fréquence : 2^{22} Hz
Usure : inférieure à 2×10^{-6}/an
Déviation de température de 0°C à 50°C : inférieure à $1{,}5 \times 10^{-5}$ par rapport à + 25°C

2.5. Caractéristiques de base de temps pour PM 6664/02

Fréquence : 2^{23} Hz
Usure: inférieure à 1×10^{-7} par mois
Déviation de température de 0°C à 50°C: inférieure à 1×10^{-6}/mois par rapport à + 25°C

2.6. Caractéristiques d'environnement

Température de stockage : — 40°C à + 70°C
Température de fonctionnement : 0°C à + 45°C
Altitude de stockage : 15.000 m (15,2 kN/m²)
Altitude de fonctionnement : 5.000 m (53,3 kN/m²)
Humidité : 10 à 90 % RH (26°C point requis)
Epreuve à la vibration : conforme à IEC 68 Fc
Epreuve au choc : conforme à IEC 68 Eb
Epreuve manipulation : conforme à IEC 68 Ec
Epreuve transportation : conforme à NLN-L88
Largeur : 145 mm
Hateur : 45 mm
Profondeur : 220 mm
Poids PM 6661 : 1400 g
Poids PM 6664 : 150 g

3. Controle des performances

3.1. Controle de fréquence

— Connecter le signal du point TP9 à la douille d'entrée par l'intermédiaire d'une sonde 10 MΩ/11 pF pour oscilloscopes.
— Vérifier si l'affichage est 4.194304 MHz ± 1 Hz.

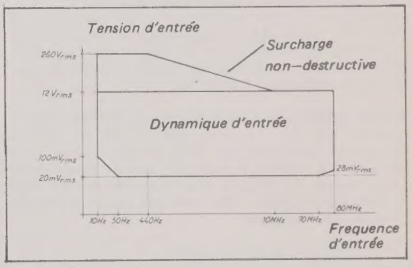
3.2. Controle de sensibilité pour PM 6661

— Connecter le source de signal à la douille d'entrée par l'intermédiaire d'une charge adaptée 50 Ω.
— Varier la fréquence de signal entre 50 Hz et 70 MHz. Le compteur doit indiquer la fréquence d'entrée correctement à un niveau d'entrée de 20 mV_{eff}.
— Mettre la source de signal à 10 Hz et vérifier que le compteur indique la fréquence d'entrée correctement à un niveau d'entrée de 100 mV_{eff}.
— Mettre la source de signal à 80 MHz et vérifier que le compteur indique la fréquence d'entrée correctement à un niveau d'entrée de 28 mV_{eff}.

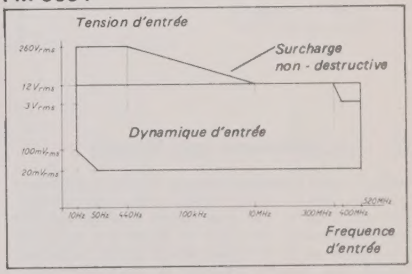
3.3. Controle de sensibilité pour PM 6664

— Connecter la source de signal à la douille d'entrée par l'intermédiaire d'une charge adaptée 50 Ω.
— Varier la fréquence de signal entre 50 Hz et 520 MHz. Le compteur doit indiquer la fréquence d'entrée correctement à un niveau d'entrée de 20 mV_{eff}.
— Mettre la source de signal à 10 Hz et verifier que le compteur indique la fréquence d'entrée correctement à un niveau d'entrée de 100 mV_{eff}.

PM 6661



PM 6664



4. Accessoires

4.1. Accessoires standard (compris - la livraison)

1 cordon certeur
1 notice d'emploi et d'entretien

4.2. Accessoires sur option

PM 9665B : Filtre passe-bas 50 kHz
PM 9669/09 : Adapteur pour montage panneau
PM 9585 : Charge adaptée 50 Ω, 1 W

Safety regulations

Upon delivery, the instrument complies with the required safety regulations. To maintain this condition and to ensure safe operation, it is recommended to follow the instructions below.

1. Before switching on

Protection The instrument is protected according to class 1 (protective earth) of the IEC 348 or VDE 0411. The mains cable provides earth connection. Outside specially protected rooms, the mains plug must be connected only to sockets with earthed contact. It is not allowed to interrupt the earth connection inside or outside the instrument.

Mounting The instrument may be used in any desired position. Do not place the instrument on any surface which produces or radiates heat, or in direct sunlight.

Earthing The instrument must be earthed in conformity with the local safety regulations. The mains cable delivered with the instrument includes a protective conductor, which is connected to the earth contacts of the plug. Thus, when connected to an earthed mains socket, the cabinet of the instrument is consequently connected to the protective earth. The circuit earth is connected internally to the external BNC socket and the cabinet. The BNC socket must not be used to connect a protective conductor. **Warning** Connect the mains cable plug only to a socket with protective earth contacts. This protection must not be ineffective e.g. by using an extension cable without earth protection.

Mains connection The instrument must be connected only to an AC supply. On delivery the instrument is set to 230 V or 115 V indicated on the plate at the rear of the instrument. Ensure that the instrument is set to the local mains voltage before switching on.
Mains connection must be made in accordance with the local safety regulations. This implies that the instrument is connected to the mains socket with a protective earth contact as described in section Earthing.

Mains adjustment and Fuses The instrument can be set to 115 V or 230 V. When the instrument is wired for 115 V the mains fuse should be 200 mA delayed action and when it is wired for 230 V the fuse should be 100 mA delayed action. To convert the instrument proceed as follows:

- Unplugg the mains cable
- Dismantle the instrument as described in section Dismantling
- Resolder the Black and Yellow wires from the Mains Transformer as shown in the figures on page 9
- Replace the fuse

2. Maintenance and Repair

Failure and Extensive Stress If the instrument is suspected of being unsafe take it out of operation. This is the case when the instrument shows physical damage or does not function anymore or is stressed beyond the tolerable limits e.g. during storage or transportation.

Dismantling the instrument When removing covers or other parts by means of tools, live parts or terminals could be exposed. Before opening the instrument, disconnect it from all power sources. If the open live instrument needs calibration, maintenance or a repair, it must be performed only by trained personnel being aware of the risks. After disconnection from all power sources, the capacitors in the instrument may remain charged for some seconds, observe the circuit diagrams. To dismantle the instrument proceed as follows:

- Unplug the mains cable
- Remove the two bottom screws
- Pull the cabinet backwards

Repair and replacing parts Repairs must be made by trained personnel. Ensure that the construction of the instrument is not altered to the detriment of safety. Above all, leakage paths, air gaps and insulation layers must not be reduced. When replacing, use only original parts. Other spare parts are only acceptable when the safety precautions for the instrument are not impaired.

Schutzmassnahmen

Dieses Gerät entspricht bei der Werksauslieferung den geltenden Schutzvorschriften. Zur Erhaltung dieses Zustands und zur Gewährleistung der Betriebssicherheit wird die genaue Einhaltung nachstehender Hinweise empfohlen.

1. Vor der Inbetriebnahme

Schutzart Das Gerät entspricht der Schutzklasse I (Schutzleiteranschluss) gemäss IEC 348 bzw. VDE 0411. Die Geräteanschlussleitung enthält einen Schutzleiter. Ausser in Räumen mit besonderen Schutzmassnahmen darf das Gerät nur an Steckdosen mit Schutzkontakten (Schuko—Steckdosen) angeschlossen werden. Jede Unterbrechung des Schutzleiters innerhalb oder ausserhalb des Geräts ist unzulässig.

Aufstellung Das Gerät ist für jede Betriebslage vorgesehen. Wärmeeinwirkung und direkte Sonneneinstrahlung sind zu vermeiden.

Erdung Das Gerät ist nach Massgabe der örtlichen Vorschriften zu erden. Der Schutzleiter der Geräteanschlussleitung ist an die Schutzkontakte des Steckers angeschlossen. Auf diese Weise ist das Gehäuse des Geräts zwangsläufig mit Erde verbunden. Das Masse-Potential steht mit der äusseren BNC—Buchse und dem Gehäuse in Verbindung. Der Anschluss des Schutzleiters an die BNC—Buchse ist nicht zulässig. **Zu beachten!** Netzstecker nur an Schuko—Steckdosen anschliessen. Diese Schutzmassnahme darf nicht unwirksam gemacht werden (z B durch Verwendung einer Verlängerungsschnur ohne Schutzleiter).

Netzanschluss Das Gerät ist nur für Betrieb an Wechselspannung vorgesehen. Werksmässig ist es auf die Spannung 230 V oder 115 V eingestellt (Typenschild auf der Geräterückwand beachten!). Bei Bedarf also erst auf die örtliche Netzspannung umschalten. Der Netzanschluss muss den örtlichen Schutzvorschriften entsprechen. In jedem Fall ist aber Anschluss über eine Steckvorrichtung mit Schutzkontakten erforderlich; siehe oben unter »Erdung».

Spannungswahl und Sicherungen Das Gerät ist auf 115 V oder 230 V einstellbar. Erforderliche Sicherungen: 115 V — 200 mA (träge); 230 V — 100 mA (träge). Umschaltung wie folgt vornehmen:

- Netzstecker ziehen
- Gehäuse abnehmen (siehe unten)
- Gelben und schwarzen Draht am Netztransformator gemäss Skizze auf Seite 9 umlöten
- Sicherung wechseln

2 Wartung und Reparatur

Fehler und Überbeanspruchung Bei Verdacht der Betriebsunsicherheit Gerät aus dem Betrieb nehmen. Dies kann der Fall sein bei sichtbaren Beschädigungen, Funktionsausfall oder übermässigen Beanspruchungen (Transport, Lagerung und dgl.).

Abnehmen des Gehäuses Beim Entfernen von Abdeckungen und Bauteilen können unter Spannung stehende Teile freigelegt werden. Vor dem Öffnen ist das Gerät daher von allen Spannungsquellen zu trennen. Abstimmung, Wartung oder Reparaturen unter Spannung dürfen nur von geschulten Fachkräften, die mit den Gefahren vertraut sind, vorgenommen werden. **Zu beachten!** Auch nach Spannungsunterbrechung sind geladene Kondensatoren noch für einige Zeit spannungführend (Schaltplan beachten!). Gehäuse wie folgt abnehmen:

- Netzstecker ziehen
- Beide Schrauben im Gehäuseboden lösen
- Gehäuse nach hinten abziehen

Reparaturen und Auswechslung von Teilen Reparaturen sind nur von Fachkräften auszuführen. Die Bauweise des Geräts darf unter keinen Umständen für den Geräteschutz nachteilig geändert werden. Insbesondere dürfen die Kriechstrecken, Sicherheitsabstände und Isolierschichten keinesfalls beeinträchtigt werden. Nur Originalersatzteile verwenden! Andere Ersatzteile sind nur zulässig, sofern sich daraus keine Nachteile für den Geräteschutz ergeben.

Prescriptions de sécurité

A la livraison, cet appareil satisfait aux normes de sécurité en vigueur. Afin de le maintenir conforme à ces normes et d'assurer son fonctionnement dans de bonnes conditions de sécurité, il est recommandé de se conformer aux instructions ci-dessous.

1. Avant la mise en marche

Protection L'appareil est protégé conformément à la classe 1 (ligne de terre protectrice) des normes IEC 348 ou VDE 0411. Son câble secteur comporte une connexion de terre. A l'extérieur des locaux spécialement protégés, ne connecter la fiche secteur qu'à des prises dotées d'un contact de terre. Toute interruption de la connexion de terre à l'intérieur ou à l'extérieur de l'appareil est proscrite.

Installation L'appareil peut être utilisé dans n'importe quelle position en fonction des besoins de l'utilisateur. Ne pas le placer sur une surface produisant ou rayonnant de la chaleur, ni à la lumière solaire directe.

Misse à la terre Mettre l'appareil à la terre conformément aux normes de sécurité locales en vigueur. Le câble secteur livré avec l'appareil comprend un conducteur protecteur relié aux contacts de terre de la fiche. Lorsqu'il est branché à une prise secteur avec terre, l'appareil a ainsi son coffret relié à la ligne de terre protectrice, laquelle est connectée intérieurement à la prise BNC externe du coffret. Ne pas utiliser cette dernière pour connecter un conducteur de protection.

Attention Ne brancher la fiche du câble secteur qu'à des prises dotées de contacts de terre. Ne pas neutraliser cette protection en utilisant par exemple un prolongateur sans conducteur de terre.

Branchement au secteur N'alimenter l'appareil qu'en courant alternatif. A sa livraison, il est couplé pour 230 V ou 115 V suivant l'indication de la plaquette placée à sa partie arrière. Bien s'assurer qu'il est couplé sur la tension secteur locale avant de le mettre en marche. La connexion de l'appareil au secteur devant être effectuée conformément aux normes locales de sécurité, elle doit comporter une ligne de terre protectrice comme décrit au chapitre Mise à la terre.

Sélection du secteur et fusibles L'appareil peut être couplé pour 115 V ou 230 V. Il doit comporter un fusible secteur de calibre 200 mA avec temporisation s'il est câblé pour être alimente en 115 V ou de calibre 100 mA avec temporisation s'il est câblé pour être alimenté en 230 V. Pour modifier le couplage de l'appareil, procéder de la manière suivante:

- Débrancher le câble secteur
- Ouvrir l'appareil comme décrit au chapitre Ouverture
- Ressouder le fil noir et le fil jaune du transformateur secteur conformément aux figures a la page 9
- Remplacer le fusible

2. Maintenance et réparation

Défauts et contraintes sévères Si la sécurité de fonctionnement de l'appareil est jugée incertaine, le retirer du service. C'est notamment le cas lorsqu'il présente des dommages matériels ou ne fonctionne plus ou encore a été soumis à des contraintes hors tolérances, par exemple lors de l'entreposage ou du transport.

Ouverture de l'appareil Lors de l'enlèvement des capots ou autres parties au moyen d'outils, des organes ou des bornes sous tension peuvent se trouver exposés. Avant d'ouvrir l'appareil, le déconnecter par conséquent de toute source d'alimentation. Si l'appareil ouvert et sous tension nécessite un calibrage, une opération de maintenance ou une réparation, ne confier le travail qu'à du personnel qualifié et conscient des risques encourus. Après déconnexion des sources d'alimentation, les condensateurs de l'appareil peuvent rester chargés pendant quelques secondes, voir les schémas de connexions. Pour ouvrir l'appareil, procéder de la maniere suivante:

- Débrancher le câble secteur
- Enlever les deux vis du fond
- Tirer le coffret vers l'arrière

Réparation et remplacement de pièces Les réparations doivent être effectuées par du personnel qualifié. S'assurer que la constitution de l'appareil n'est pas modifiée au détriment de la sécurité. Avant tout, les lignes de fuite, les entrefers et les revêtements isolants ne doivent pas être réduits. Pour tout échange, n'utiliser que des pièces détachées d'origine. Les autres pièces de rechange ne sont acceptables que si le niveau de sécurité de l'appareil reste inchangé.

Service Part

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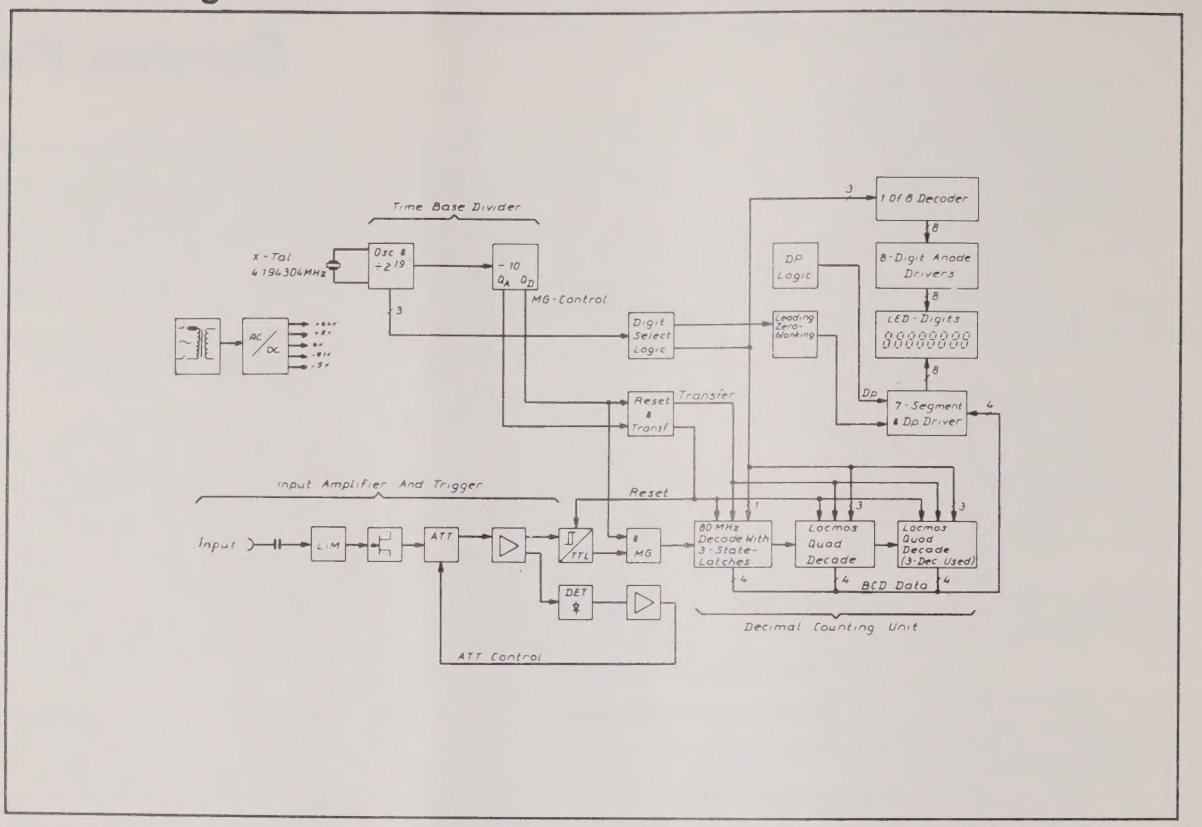
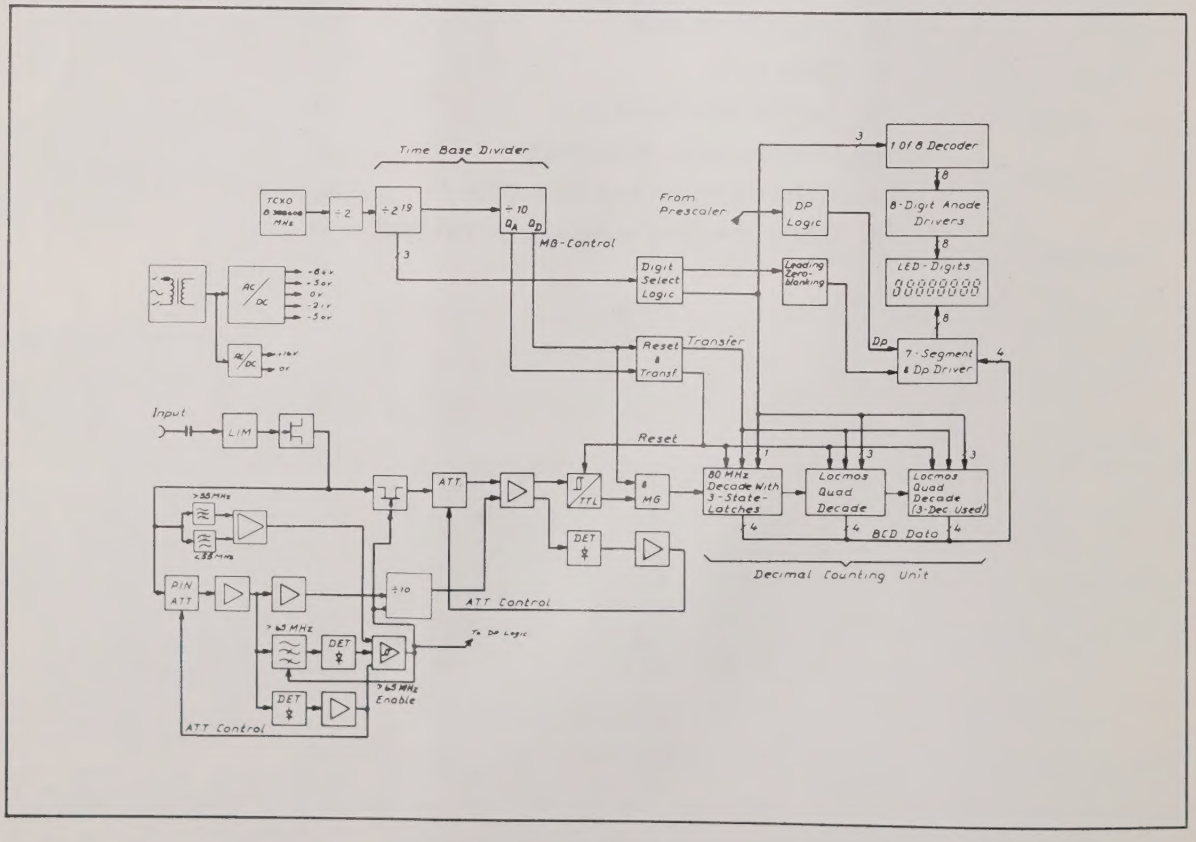
6. Block diagram PM 6661



7. Block diagram PM 6664



8. Power supply

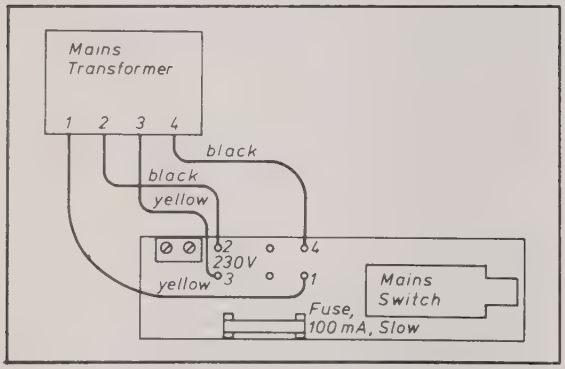
Test conditions

The d.c. voltages in the circuit diagram are typical and vary between instruments.
The voltages are measured without input signal and related to earth.
The test instrument shall have an input impedance of at least 40 k ohm/V

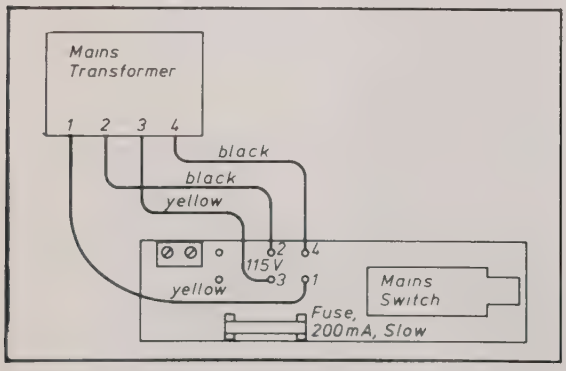
Test points

Test point	*Nominal voltage (V)*	*Measured voltage (V)*	*Ripple mV*
TP1	+ 6.4	+ 6.2 . . . 6.6	50
TP2	+ 5	+ 4.75 . . .5.25	5
TP3	0	0	
TP4	−2.1	−1.9 . . . −2.3	5
TP5	−5	−4.8 . . . −5.2	2

230 V connection



115 V connection



9. Input amplifier

Test conditions

All d.c. voltages were measured without input signal with a voltmeter with an input resistance of 1 M ohm
Unless otherwise stated pulses were measured with input signal from TP9 connected to the input of the counter via a 10 M ohm/11 pF oscilloscope probe.
All voltages are typical and vary between intruments.

DC balance adjustment

- Connect a voltmeter between terminals 2 and 3 of IC 111 and adjust R 128 to 0V ± 50 mV.
- Interconnect terminals 3 and 7 of IC 405 (PM 6664 only)
- Disconnect the voltmeter and connect a 80 MHz/ 20mV$_{rms}$ sine wave signal to the input socket of the counter.
- Vary the input frequency and readjust R 128 to highest possible frequency read out.
- Disconnect terminals 3 and 7 of IC 405 (PM 6664 only

AGC check

- Connect a 1 kHz/5 mV$_{rms}$ sine wave signal to the input socket of the counter.
- Connect a voltmeter to TP7 and check that the read out is − 2 V to − 3 V.
- Observe the display and increase the amplitude of the input signal until the display read out becomes correct and stable.
- Note the amplitude of the input signal (U1).
- Observe the voltmeter and increase the amplitude of the input signal until the voltmeter read out becomes positive.
- Note the amplitude of the input signal (U2).
- Check that the ratio U2/U1 is between 2 . . . 3.
- Repeat the procedure at 50 MHz.

10. Standard oscillator

Oscillator frequency adjustment PM 6661 and PM 6664/01

- Connect a counter with an accuracy better than 10^{-6} to TP 9.
- Adjust C 132 to 4.194304 MHz.

11. Decimal counting

Quad decade IC 125 and IC 126

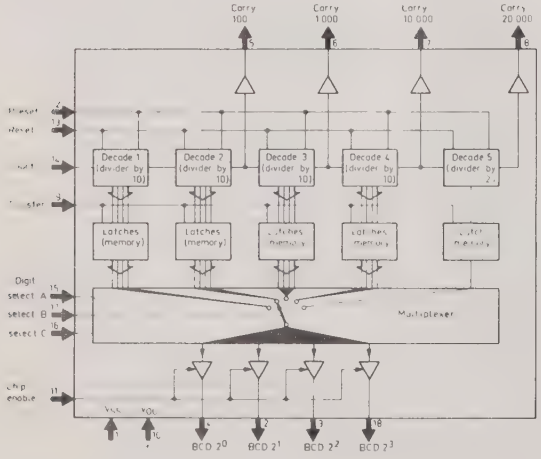
The Quad Decade contains four separate decades and a flip-flop, in this application the flip-flop is not used.
The Preset Input is a common input for the decades, a High level applied to this input will preset all decades to 19999.
The Reset Input is also a common input and a High level applied to this input will reset all decades to zero.
The Count Input is an exclusive input for the first decade, the signal to be counted is applied to this input. Each decade has a Carry Output which is connected to the Carry Input of the following decade.
All carry signals except from the first decade are available

for measurement, in this application only Carry 10 000 is used.
The carry signal is active Low and its pulse width is equal to the repetition time of the signal at the Count Input.
Each decade has also a BCD output and a Latch.
The latch is a memory where the BCD information from the decades are stored.
The Transfer Input is a common input for the latches, a High Level applied to this input will open all latches and feed the BCD information stored in the latches to the multiplexer.

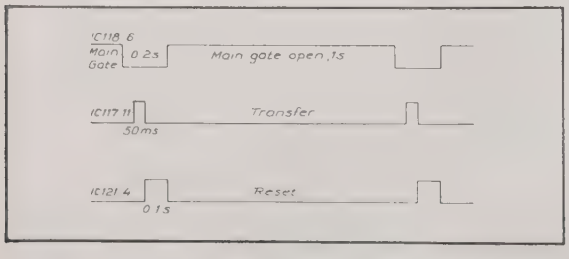
The Multiplexer is a programmable selector, the signals applied at the digit select inputs determines which latch the multiplexer will select, in this application input C is not used.
The BCD output is a tri state output, it can be logic 1, logic 0 or high-ohmic.
A High Level at Chip Enable Input will allow the multiplexer pass the BCD information in the preselected latch to the BCD output, a Low level makes the output high-ohmic.

Digit select A	Digit select B	Decade selection
L	L	Decade 1
H	L	Decade 2
L	H	Decade 3
H	H	Decade 4

Block diagram Quad decade



Timing diagram



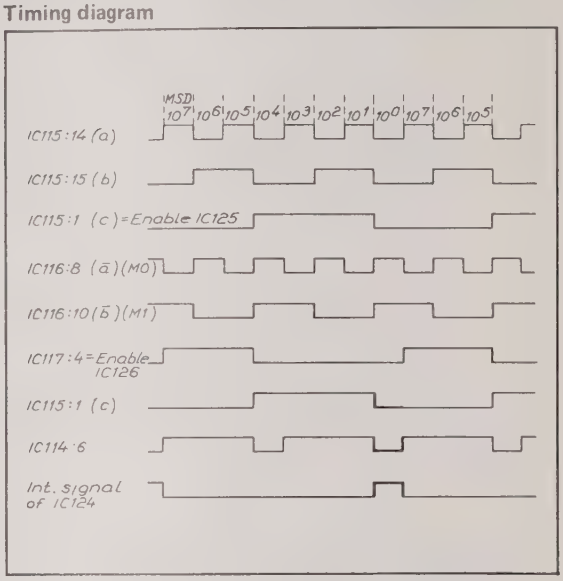
The timing diagram was measured without input signal with a two channels oscilloscope triggered on the main gate signal at IC 118:6.

12. Display and Drivers

Test conditions

The timing diagram was measured without input signal with a two channels oscilloscope triggered on IC 117:4 or IC 115:1.

Timing diagram



Truth table IC 129

Display digit	Terminal number IC 129						
	6 2 1 7	13 a	12 b	11 c	10 d	9 e	15 f	14 g
0	0 0 0 0	L	L	L	L	L	L	L
1	0 0 0 1	–	L	L	–	–	–	–
2	0 0 1 0	L	L	–	L	L	–	L
3	0 0 1 1	L	L	L	L	–	–	L
4	0 1 0 0	–	L	L	–	–	L	L
5	0 1 0 1	L	–	L	L	–	L	L
6	0 1 1 0	L	–	L	L	L	L	L
7	0 1 1 1	L	L	L	–	–	–	–
8	1 0 0 0	L	L	L	L	L	L	L
9	1 0 0 1	L	L	L	L	–	L	L

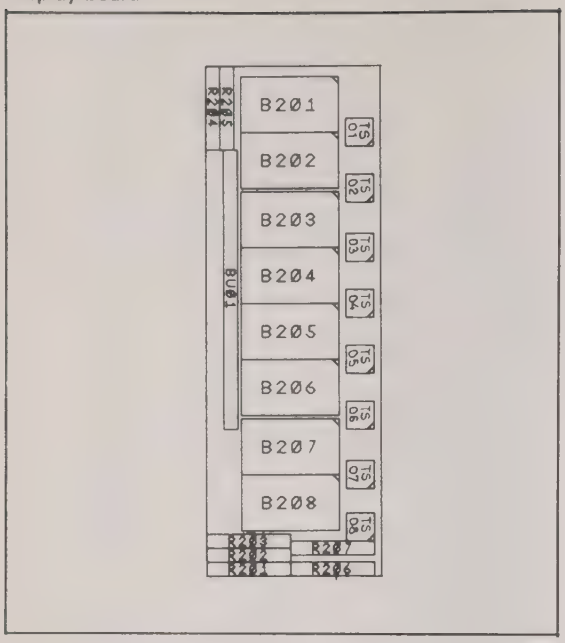
$0 < 0.4$ V $L \approx 0.4$ V
$1 > 2.5$ V $- \gtrsim 1.5$ V

Display with wrong indication

Display value MHz kHz Hz	Possible source of error
7 6.5 4 3.2 1 8	O.K.
▪ ▪ ▪ 4 3.2 1 8	IC 126
7 6.5 ▪ ▪ ▪ ▪ 8	IC 125
7 6.5 4 3.2 1 ▪	IC 124
7 6 5 4 3 2 1 8	IC 128
7 ▪ 5 4 3.2 1 8	TS 207
7 6.5 ▪ 3.2 1 8	TS 205
▪ ▪ ▪ ▪ ▪ ▪ ▪ 8	IC 126 or IC 121 IC 119–122–129 or input ampl
1 6.5 4 3.2 1 8	IC 129, R 201

▪ no read out

Display board



Frequency adjustment of the TCXO (PM 6664/02)

This adjustment requires a reference oscillator having an accuracy of 10^{-7} or better.

The oscillator must have been operating at least 1 hour before any adjustment is made.

- Connect the reference signal to the input socket of the counter.
- Adjust C 427 until the display shows the frequency of the reference oscillator ±1 Hz.

HF and LF Comparator adjustment.

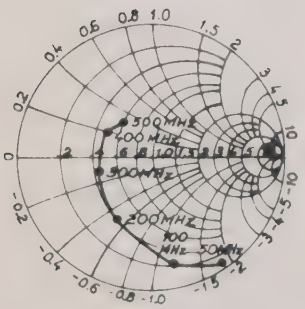
- Adjust R 445 until output 6 of IC 407 goes from high to low.
- Connect a voltmeter between – 5V and the slide contact of R445.
- Note the voltmeter read out and adjust R445 until the voltmeter read out has increased + 2V.

  C441 and C442 are set to 55 MHz at the factory and need no readjustment.

13. Prescaler PM 6664

Input impedance PM 6664

At frequencies up to 10 MHz and an input voltage up to 500 mV the input impedance is 1 M ohm//25 pF.
At frequencies below 200 MHz a 50 ohm input impedance can be obtained with the optional 50 ohm feed-through termination PM 9585.



Typical input impedance characteristic of PM 6664 normalized to 50 ohm

VSWR in a 50 ohm system

Frequency (MHz)	200	200	400	500
VSWR	2.5:1	3:1	2:1	2:1
	(with PM 9585)			

14. Spare parts

Resistors

Ordering no	Ω	%	Type	Item
4822 110 63065	27	5	CR25	R1
4822 110 63083	120	5	CR25	R101
4822 110 63105	820	5	CR25	R102
4822 110 63089	220	5	CR25	R103
4822 110 63178	470K	5	CR25	R112
4822 110 63094	330	5	CR25	R117
4822 110 63081	100	5	CR25	R118
4822 110 63081	100	5	CR25	R120
4822 110 63081	100	5	CR25	R121
4822 110 63134	10K	5	CR25	R122
4822 110 63081	100	5	CR25	R123
4822 110 63152	47K	5	CR25	R124
4822 110 63089	220	5	CR25	R125
4822 110 63089	220	5	CR25	R126
4822 110 63143	22K	5	CR25	R127
5322 100 10113	10K	20	TRIM	P128
4822 110 63118	2.7K	5	CR25	R129
4822 110 63116	2.2K	5	CR25	R130
4822 110 63125	4.7K	5	CR25	R131
4822 110 63116	2.2K	5	CR25	R132
4822 110 63125	4.7K	5	CR25	R133
4822 110 63167	180K	5	CR25	R134
4822 110 63167	180K	5	CR25	R135
4822 110 63085	150	5	CR25	R136
4822 110 63094	330	5	CR25	R137
4822 110 63089	220	5	CR25	R138
4822 110 63094	330	5	CR25	R139
4822 110 63101	560	5	CR25	R140
4822 110 63214	10M	10	CR25	R141
4822 110 63152	47K	5	CR25	R142
4822 110 63152	47K	5	CR25	R143
4822 110 63081	100	5	CR25	R144
4822 110 63081	100	5	CR25	R145
4822 110 63134	10K	5	CR25	R146
4822 110 63134	10K	5	CR25	R147
4822 110 63178	470K	5	CR25	R148
4822 110 63187	1M	5	CR25	R149
4822 110 63134	10K	5	CR25	R150
4822 110 63107	1K	5	CR25	R151
4822 110 63152	47K	5	CR25	R152
4822 110 63152	47K	5	CR25	R153
4822 110 63152	47K	5	CR25	R154
4822 110 63152	47K	5	CR25	R155
4822 110 63085	150	5	CR25	R156
4822 110 63094	330	5	CR25	R157
4822 110 63116	2.2K	5	CR25	R158
4822 110 63107	1K	5	CR25	R159
4822 110 63081	100	5	CR25	R201-07
4822 110 63098	470	5	CR25	R401
4822 110 63116	2.2K	5	CR25	R402
4822 110 63147	33K	5	CR25	R403
4822 110 63125	4.7K	5	CR25	R404
4822 110 63096	390	5	CR25	R405
4822 110 63149	39K	5	CR25	R406
4822 110 63147	33K	5	CR25	R407
4822 110 63138	15K	5	CR25	R408
4822 111 30324	100	5	CR16	R409
4822 110 63107	1K	5	CR25	R410
4822 110 63138	15K	5	CR25	R411
4822 110 63134	10K	5	CR25	R412
4822 110 63141	18K	5	CR25	R413
4822 110 63161	100K	5	CR25	R414
4822 110 63134	10K	5	CR25	R415
4822 110 63103	680	5	CR25	R416
4822 110 63134	10K	5	CR25	R417
4822 110 63112	1.5K	5	CR25	R418
4822 111 30269	1K	5	CR16	R419
4822 110 63169	220K	5	CR25	R420
5322 111 44153	15	5	CR16	R421
4822 111 30272	680	5	CR16	R422
4822 111 30323	270	5	CR16	R423
4822 111 30264	2.7K	5	CR16	R424
4822 110 63101	560	5	CR25	R425
4822 111 30245	47	5	CR16	R426
4822 111 30347	10	5	CR16	R427
4822 110 63134	10K	5	CR25	R428
4822 110 63103	680	5	CR25	R429
4822 110 63107	1K	5	CR25	R430
4822 110 63101	560	5	CR25	R433
4822 110 63143	22K	5	CR25	R434
4822 110 63107	1K	5	CR25	R435
4822 110 63098	470	5	CR25	R436
4822 110 63089	220	5	CR25	R441
4822 110 63116	2.2K	5	CR25	R442
5322 116 54743	301K	1	MR25	R443
4822 110 63178	470K	5	CR25	R444
5322 101 14069	22K	20%	POTM	R445
5322 116 54743	301K	1	MR25	R446
4822 110 63187	1M	5	CR25	R451
4822 110 63214	10M	5	CR25	R453
4822 116 51098	100	5	PR37	R455
4822 110 63098	470	5	CR25	R458
4822 110 63081	100	5	CR25	R459
4822 110 63089	220	5	CR25	R460
4822 110 63134	10K	5	CR25	R461
4822 110 63134	10K	5	CR25	R462
4822 110 63147	33K	5	CR25	R465
4822 110 63134	10K	5	CR25	R467
4822 110 63118	2.7K	5	CR25	R468
4822 110 63161	100K	5	CR25	R469

Capacitors

Ordering no	F	%	V	Item
4822 124 20586	150M	-10+50	16	C101
5322 124 14053	33M	-10+50	10	C102
4822 124 20525	1500M	-10+50	16	C103
4822 124 20525	1500M	-10+50	16	C104
4822 124 20525	1500M	-10+50	16	C105
5322 124 14079	68M	-10+50	6.3	C106
5322 124 14079	68M	-10+50	6.3	C107
4822 122 31173	220P	10	100	C112
4822 122 30045	27P	2	100	C113
5322 121 40323	100N	10	100	C114
5322 122 34041	10N	-20+50	100	C116
5322 122 34041	10N	-20+50	100	C117
5322 124 14079	68M	-10+50	6.3	C118
5322 124 14066	10M	-10+50	6.3	C119
5322 124 14079	68M	-10+50	6.3	C120
5322 124 14079	68M	-10+50	6.3	C121
4822 122 31175	1N	10	100	C122
5322 124 14053	33M	-10+50	10	C123
5322 124 14075	2.2M	-10+50	16	C124
5322 124 14075	4.7M	-10+50	10	C125
5322 124 14079	68M	-10+50	6.3	C126
5322 121 40323	100N	10	100	C127
5322 122 34041	10N	-20+50	100	C128
5322 122 34041	10N	-20+50	100	C129
5322 122 34041	10N	-20+50	100	C130
4822 122 31078	82P	2	100	C131
4822 125 50017	5.5-65P		100	C132
4822 122 31072	47P	2	100	C133
4822 122 31078	82P	2	100	C134
4822 122 31175	1N	10	100	C135
4822 122 31067	33P	2	100	C136
5322 122 34041	10N	-20+50	100	C137
4822 122 31067	33P	2	10	C138
4822 124 20461	47M	-10+50	10	C140
4822 122 31175	1N	10	100	C141
5322 122 34041	10N	-20+50	100	C142
5322 121 40323	100N	10	100	C143
5322 121 40323	100N	10	100	C144
4822 122 31067	33P	2	100	C401
4822 122 31072	47P	2	100	C402
4822 122 30043	10N	-20+80	63	C403
4822 122 31047	5.6P	2	100	C404
4822 122 30043	10N	-20+80	63	C405
4822 122 31173	220P	10	100	C406
4822 122 31173	220P	10	100	C407
4822 122 31072	47P	2	100	C408
4822 122 31175	1N	10	100	C409
4822 122 31067	33P	2	100	C410
4822 122 31072	47P	2	100	C411
4822 122 31063	22P	2	100	C412
4822 122 31175	1N	10	100	C413
4822 122 31173	220P	10	100	C414
4822 122 31173	220P	10	100	C415
4822 122 31177	470P	10	100	C416
4822 122 31175	1N	10	100	C417
4822 122 31072	47P	2	100	C418
4822 122 31072	47P	2	100	C419
4822 122 31175	1N	10	100	C420
4822 122 30043	10N	-20+80	63	C421
4822 122 31173	220P	10	100	C422
5322 124 14064	4.7M	-10+50	10	C425
4822 122 31067	33P	2	100	C426
5322 125 54003	5.5-65P			C427
4822 122 30043	10M	-20+80	63	C428
4822 124 20461	47M	-10+50	10	C431
4822 124 20461	47M	-10+50	10	C432
4822 122 30043	10N	-20+80	63	C433
4822 122 30043	10N	-20+80	63	C434
5322 125 54029	2-18P			C441
5322 125 54029	2-18P			C442
4822 122 30043	10N	-20+80	63	C443
5322 124 14079	68M	-10+50	6.3	C444
4822 122 30043	10N	-20+80	63	C445
4822 122 31067	33P	2	100	C446
5322 122 34045	0.33N	10	500	C451
4822 122 30045	27P	2	100	C453
5322 124 14079	68M	-10+50	6.3	C454
4822 122 30043	10N	-20+80	63	C455
4822 122 30043	10N	-20+80	63	C456
4822 122 30043	10N	-20+80	63	C457
4822 122 30043	10N	-20+80	63	C458
4822 124 20529	1000M	-10+50	25	C459
4822 124 20529	1000M	-10+50	25	C460
4822 124 20586	150M	-10+50	16	C461
4822 124 20586	150M	-10+50	16	C462
4822 122 30043	10N	-20+80	63	C463

4822 122 30043	M	10N	-20+80	63	C464
4822 122 30043	M	10N	-20+80	63	C467
4822 122 31047	M	5,6P	2	100	C468
4822 122 31173	M	220P	10	100	C469
4822 122 31072	M	47P	2	100	C470
4822 122 31173	M	220P	10	100	C471
4822 122 31173	M	220P	10	100	C472
4822 122 31173	M	220P	10	100	C473
5322 124 14079		68M	-10+50	6,3	C474
4822 122 31047	M	5,6P	2	100	C475
5322 122 34043		47P	10	50	C476
5322 122 34043		47P	10	50	C477
5322 122 34043		47P	10	50	C478
5322 122 34043		47P	10	50	C479
4822 122 30043	M	10N	-20+80	63	C480
5322 122 34043		47P	10	63	C481

Transistors

Ordering no.		Type	Item
5322 130 44418		BF256A	TS101
5322 130 40745		BFW92	TS102
4822 130 40937	M	BC548B .60	TS103
5322 130 44435		2N5770	TS104
5322 130 44435		2N5770	TS105
4822 130 40937	M	BC548B	TS106
5322 130 44593		BC369	TS201-07
4822 130 40937	M	BC548B	TS401
5322 130 40745		BFW92	TS402
5322 130 44179		BFR90	TS403
5322 130 44435		2N5770	TS404
5322 130 44418		BF256A	TS405
5322 130 44418		BF256A	TS406
5322 130 40745		BFW92	TS407

Diodes

Ordering no.	Type	Item
5322 130 30414	BY164	GR101
5322 130 30613	BAW62	GR102
5322 130 34047	BZX75-C1V4	GR104
5322 130 34049	BZX75-C2V1	GR105
5322 130 30594	BAV10	GR113
5322 130 30594	BAV10	GR114
5322 130 30594	BAV10	GR115
5322 130 30594	BAV10	GR116
5322 130 30594	BAV10	GR117
5322 130 34173	BZX79-C5V6	GR118
5322 130 30613	BAW62	GR121
5322 130 34364	BA379	GR401
5322 130 34364	BA379	GR402
5322 130 34364	BA379	GR403
5322 130 30613	BAW62	GR404
5322 130 34302	BA280	GR405
5322 130 34302	BA280	GR406
5322 130 34302	BA280	GR407
5322 130 34302	BA280	GR408
5322 130 30613	BAW62	GR409
5322 130 34302	BA280	GR411
5322 130 34302	BA280	GR412
5322 130 30613	BAW62	GR413
5322 130 34045	FD777	GR416
5322 130 34364	BA379	GR417
5322 130 30414	BY164	GR419
5322 130 34302	BA280	GR420
5322 130 30644	BA182	GR421
5322 130 30613	BAW62	GR422
5322 130 34047	BZX75-C1V4	GR423
5322 130 30613	BAW62	GR424
5322 130 34302	BA280	GR425

Intergrated Circuits

Ordering no.	Type	Item
5322 209 84454	MC7805CP	IC101
5322 209 85456	MC7905CP	IC102
5322 209 84825	MC10216P	IC111
5322 111 94015	6X1K	IC112
5322 209 85254	SN72741P	IC113
5322 209 14019	F34069PC	IC114
5322 209 14022	F34040PC	IC115
5322 209 14024	F34024PC	IC116
5322 209 84976	F34001PC	IC117
5322 209 14018	F34049PC	IC118
5322 209 14021	F34050PC	IC119
5322 209 85255	SN74LS90N	IC120
5322 209 85312	SN74LS02N	IC121
5322 209 85411	SN74S196N	IC122
5322 111 94031	6X47K	IC123
5322 209 14025	MC14076CP	IC124
5322 209 84722	GZF1201P	IC125
5322 209 84722	GZF1201P	IC126
5322 209 14023	F34556PC	IC127
5322 209 84167	SN74S00N	IC128
5322 209 85457	SN74247N	IC129
5322 209 84996	SN74LS10N	IC130
5322 209 85578	N OM335	IC401
5322 209 85578	OM335	IC402
5322 209 85458	N 11C90DC FAIRCHILD	IC403
5322 209 85254	SN72741P	IC404
5322 209 85254	SN72741P	IC405
5322 209 85254	SN74LS74N	IC406
5322 209 85254	SN72741P	IC407
5322 209 85577	N MA78M12UC	IC408

Inductances

Ordering no.	Description	Item
5322 158 10243	INDUCTANCE 100MH 20%	L101
5322 158 10243	INDUCTANCE 100MH 20%	L102
5322 158 10289	INDUCTANCE 680NH 20%	L103
4822 526 10025	FXC BEAD	L104
4822 526 10025	FXC BEAD	L105
5322 158 14119	COIL	L401
5322 158 14119	COIL	L402
5322 158 10276	INDUCTANCE 4,7MH	L403
4822 526 10025	M FXC BEAD	L404
4822 526 10025	M FXC BEAD	L405
5322 157 44024	COIL	L406
4822 526 10025	M FXC BEAD	L407
5322 158 14049	INDUCTANCE 150N 20%	L408
4822 526 10025	M FXC BEAD	L409
5322 158 14049	INDUCTANCE 150NH	L410
4822 526 10025	M FXC BEAD	L411
5322 158 10052	HF CHOKE	L412
5322 158 10052	HF CHOKE	L413
5322 158 10289	INDUCTANCE 680NH	L415
5322 158 10289	INDUCTANCE 680NH	L416
5322 158 10052	HF CHOKE	L421
5322 158 10052	HF CHOKE	L422

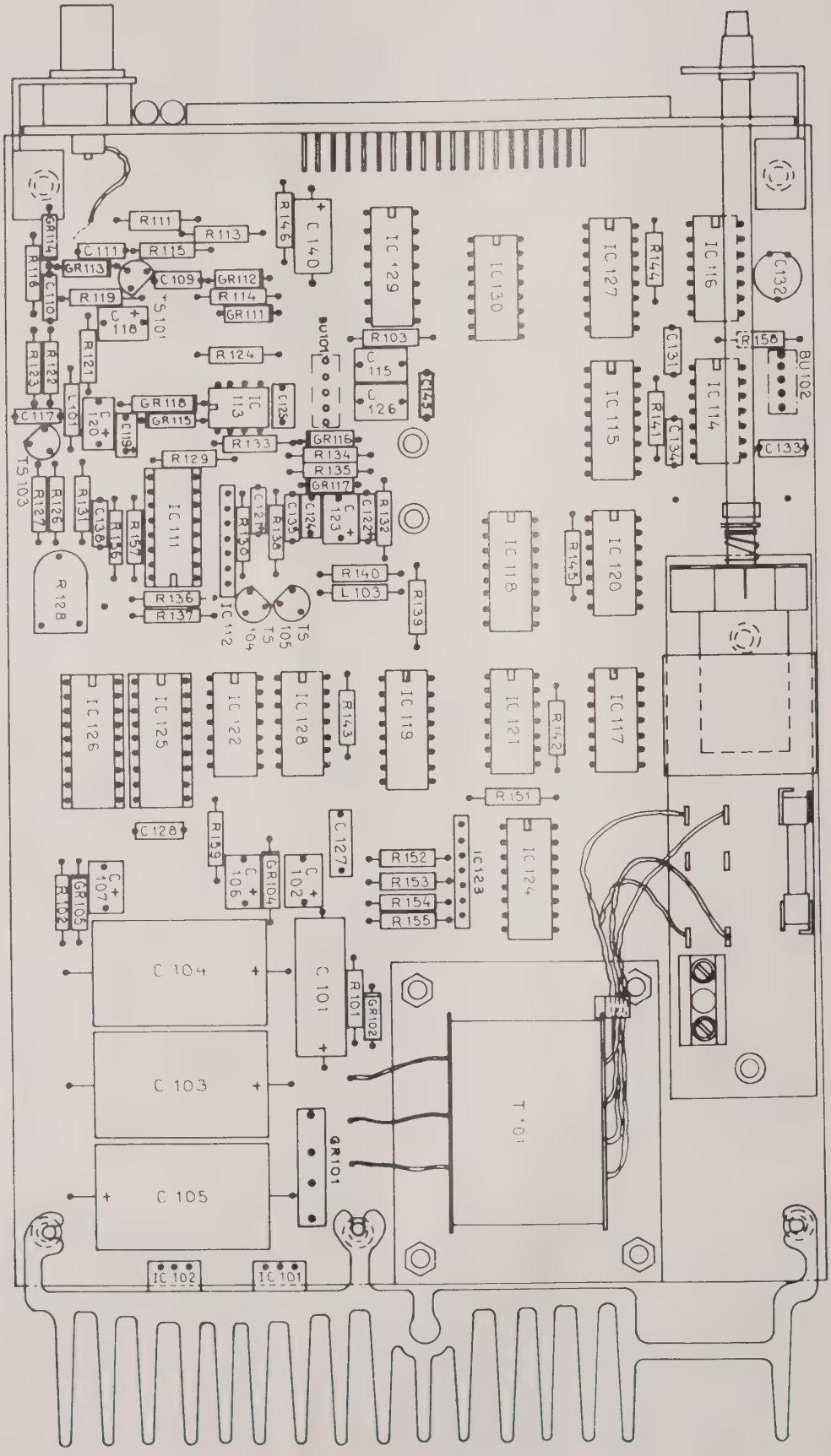
Mechanical

Ordering no.	Description	Item
5322 265 54006	CONNECTOR 10P FEMALE	BU101
5322 265 54006	CONNECTOR 5P FEMALE	BU102
5322 264 54017	CONNECTOR 20P MALE	BU103
5322 267 10004	INPUT CONNECTOR BNC	BU104
5322 265 54006	CONNECTOR 10P FEMALE	BU105
5322 255 44107	IC HOLDER 16P DIL	
5322 255 44112	IC HOLDER 18P DIL	
5322 265 54006	CONNECTOR 10P FEMALE	PO BU401
5322 265 64062	CONNECTOR 10P MALE	PO BU401
5322 265 54006	CONNECTOR 5P FEMALE	PO BU402
5322 265 64062	CONNECTOR 5P MALE	PO BU402
5322 267 34043	CONNECTOR	BV403
5322 456 14057	N TEXT PLATE PM6661	
5322 456 14058	TEXT PLATE PM6664	
5322 459 24066	N WINDOW	
5322 462 44292	N FOOT FOR CABINET	
5322 460 64022	N FRAME	
5322 325 50101	HOLDER MAINS CABLE	
5322 290 64175	N CONNECTOR 2P	
5322 256 34031	FUSEHOLDER	
5322 276 14066	MAINS SWITCH	
4822 253 20006	M FUSE 220V 100MA	
4822 253 20009	M FUSE 110V 200MA	
5322 414 14011	PUSH BUTTON	
5322 535 94648	EXTENSION BAR	
4822 492 60705	M CLAMPING SPRING	
5322 462 44291	N CAP OVER FUSE	

Miscellaneous

Ordering no.	Description	Item
5322 130 34524	7-SEGM DISPLAY MODUL PHILIPS COY81	
5322 209 85455	7-SEGM DISPLAY MODUL MONS,MAN72 CLASS C	
5322 146 14125	MAINS TRANSFORMER	T101
5322 242 74131	X-TAL	KT101
5322 216 94174	N TCXO 8388608HZ	KT401

Basic Board


R111
R113
C111
R115
GR113
C109
GR112
R119
R114
GR111
C110
C118
TS101
R116
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R121
R122
R123
C117
L101
R124
R146
C140
IC129
R103
C115
C126
BU101
C125
GR118
GR115
C120
C119
IC113
R133
GR116
R134
R135
GR117
R129
TS103
R127
R126
R131
C138
R157
R156
IC111
R128
C127
C124
C123
C122
R132
R130
R136
R137
IC112
TS104
TS105
R140
L103
R139
IC130
IC127
IC116
R144
C132
R158
BU102
C131
IC115
IC114
R141
C134
C133
IC118
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R145
IC126
IC125
IC122
IC128
R143
IC119
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IC117
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R150
C127
R152
R153
R154
R155
IC123
IC124
C107
GR105
R102
C106
GR104
C102
C101
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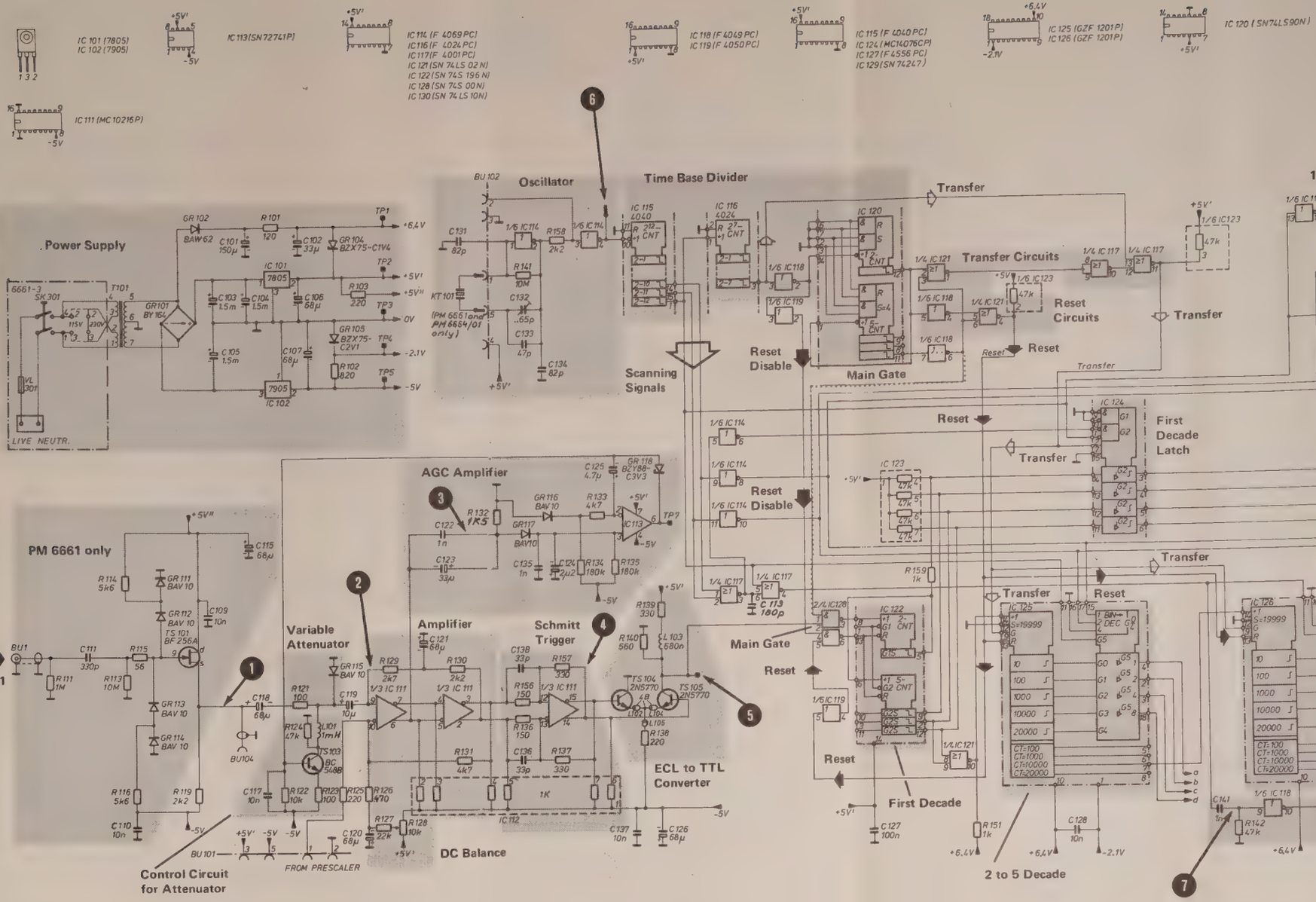
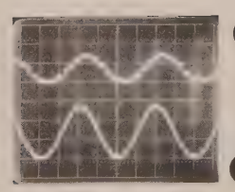
GR102
C104
C103
C105
GR101
T101
IC102
IC101

Basic Board

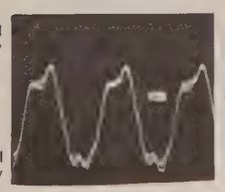


Oscillograms 1 to 6 were recorded with a sampling oscilloscope and oscillograms 7 to 10 with a 2 channels 10 MHz oscilloscope.
The input was a 50 MHz/150 mVpp sine wave signal.

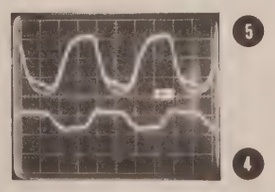


2 DC level -650mV
1 DC level -530mV

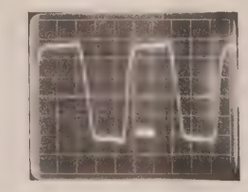
5ns/div
40mV/div



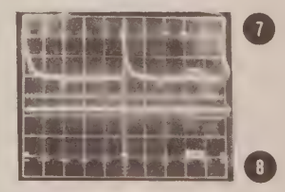
3
5ns/div
40mV/div



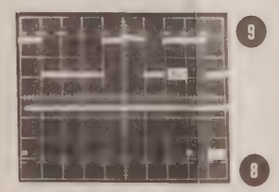
5
4
5ns/div
0V/div



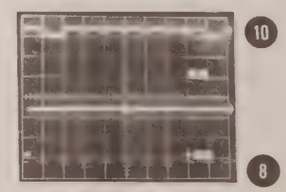
6
50ns/div
1V/div



7
8
200µs/div
2V/div

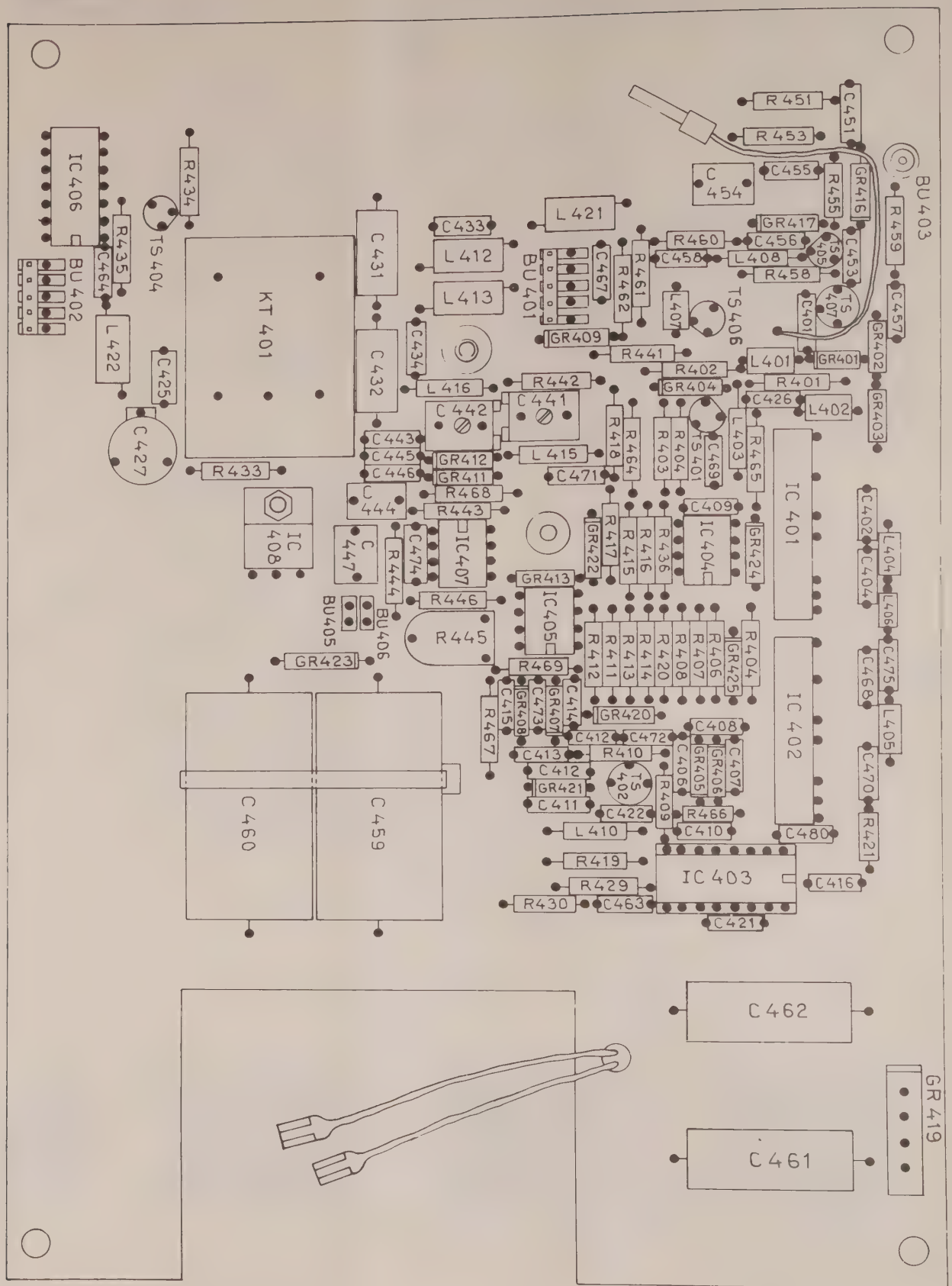


9
8
Time base is adjusted to 1 decade/div
2V/div



10
8
Time base is adjusted to 1 decade/div
2V/div

Prescaler


R 451
C 451
R 453
BU 403
C 454
C 455
GR 416
R 455
R 459
GR 417
C 456
C 453
TS 405
L 421
C 433
R 460
C 458
L 408
R 458
L 412
BU 401
C 467
R 461
R 462
TS 407
C 401
C 457
L 413
L 407
TS 406
GR 409
R 441
L 401
GR 401
GR 402
R 402
GR 404
R 401
GR 403
C 434
L 416
R 442
C 426
L 402
C 431
C 432
KT 401
C 442
C 441
L 403
R 465
IC 401
C 443
C 445
GR 412
L 415
R 418
R 464
R 404
R 403
TS 401
C 469
C 471
R 433
C 446
GR 411
R 468
C 444
R 443
C 409
IC 404
GR 424
C 402
C 404
L 404
L 406
C 475
L 405
IC 408
C 447
R 444
C 474
IC 407
GR 422
R 417
R 415
R 416
R 436
GR 413
IC 405
R 446
R 445
BU 405
BU 406
R 404
R 412
R 411
R 413
R 414
R 420
R 408
R 407
R 406
GR 425
C 468
C 470
R 421
GR 423
R 469
C 473
GR 407
C 414
GR 420
C 408
C 407
C 415
GR 408
C 412
C 472
C 413
R 410
GR 405
GR 406
C 412
C 406
R 409
GR 421
TS 402
C 411
C 422
R 466
C 410
C 480
L 410
R 419
IC 403
C 416
R 429
R 430
C 463
C 421
IC 406
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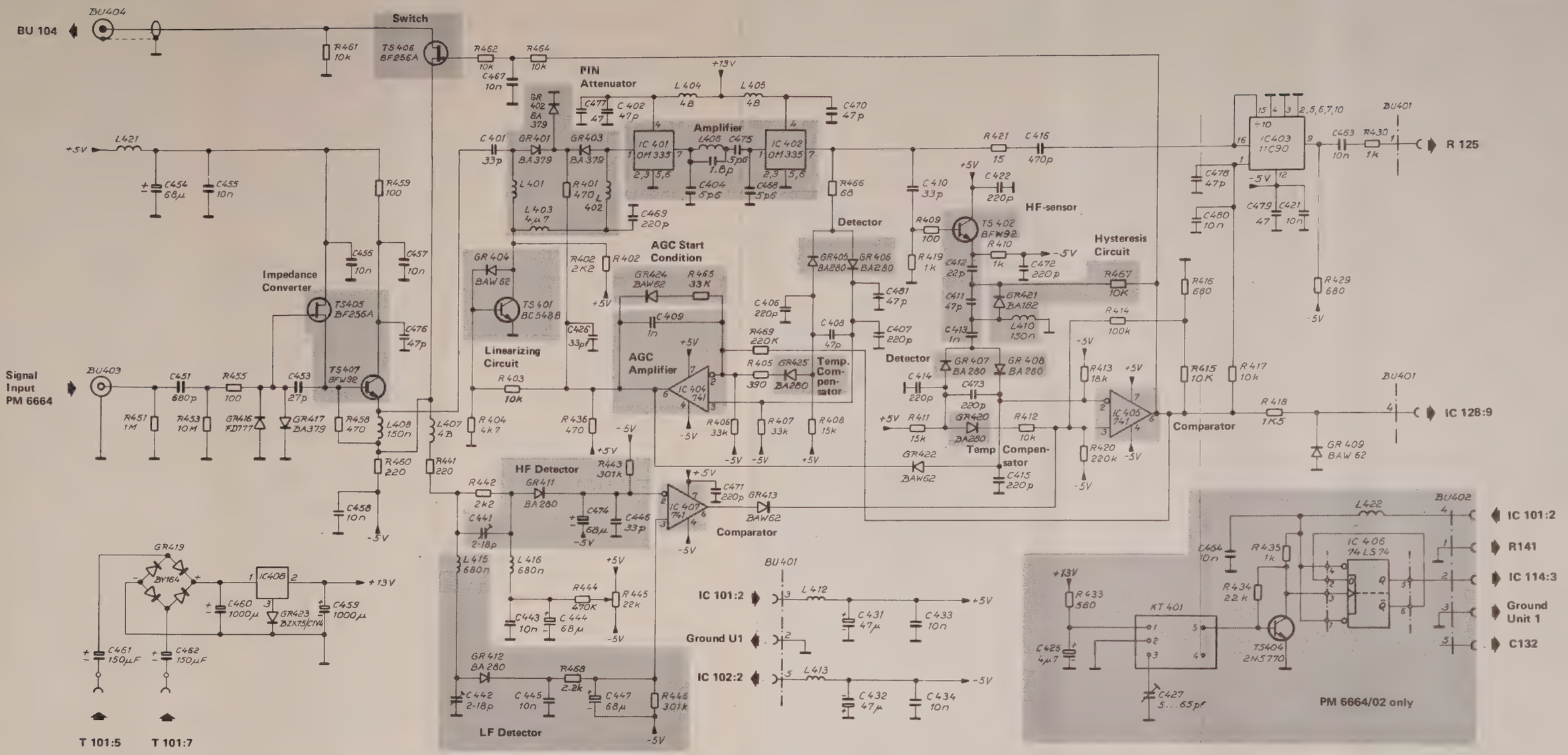
R 434
TS 404
R 435
C 464
L 422
C 425
C 427
C 460
C 459
C 462
C 461
GR 419


BU 104
BU404
Switch
TS 406 BF256A
R461 10k
R462 10k
R464 10k
C467 10n
PIN Attenuator
GR 402 BA 379
C477 47
C 402 47p
+13V
L 404 4B
L 405 4B
C470 47p
Amplifier
IC 401 OM 335
IC 402 OM 335
L406
C475 3p6
1.8p
C404 5p6
C468 5p6
C 401 33p
GR401 BA 379
GR403 BA 379
L 401
L 403 4µ7
R 401 470 L 402
C469 220p
R466 68
Detector
GR405 BA280
GR406 BA280
C481 47p
C 408 47p
C407 220p
C 406 220p
AGC Start Condition
GR424 BAW62
R465 33K
C 409 1n
R469 220K
AGC Amplifier
IC 404 741
R405 390
GR425 BA280
Temp. Compensator
R406 33k
R 407 33k
R408 15k
R 403 10K
R 404 4k7
R436 470
R443 301k
HF Detector
GR411 BA 280
R442 2k2
C441 2-18p
C474 68µ
C446 33p
C471 220p
GR413 BAW62
IC 407 741
Comparator
R421 15
C 416 470p
C 410 33p
+5V
C 422 220p
HF-sensor
TS 402 BFW92
R409 100
R 419 1k
R 410 1k
-5V
C472 220p
Hysteresis Circuit
R467 10K
C412 22p
C411 47p
GR421 BA182
L410 150n
C413 1n
R414 100k
GR 407 BA 280
GR 408 BA 280
C 414 220p
C473 220p
GR420 BA280
Temp Compensator
C415 220p
R411 15k
GR422 BAW62
R412 10k
R413 18k
R420 220k
IC 405 741
Comparator
R416 680
R415 10K
R 417 10k
R 418 1K5
GR 409 BAW 62
BU401
R 125
IC 128:9
÷10
IC403 µC90
C478 47p
C480 10n
C479 47
C421 10n
C463 10n
R430 1k
C429 680
Signal Input PM 6664
BU403
C451 680p
R455 100
C453 27p
TS407 BFW92
R451 1M
R433 10M
GR416 FD777
GR417 BA379
R458 470
L408 150n
L407 4B
R460 220
R441 220
C458 10n
Impedance Converter
TS405 BF256A
C456 10n
C457 10n
C476 47p
R459 100
L421
C454 68µ
C455 10n
+5V
GR 404 BAW 62
TS 401 BC 548B
Linearizing Circuit
R402 2K2
C426 33pf
R 402
C 409 1n
R 403 10K
R 404 4k7
R436 470
R443 301k
R442 2k2
C441 2-18p
GR411 BA 280
C474 68µ
C446 33p
C471 220p
GR413 BAW62
IC 407 741
Comparator
L415 680n
L 416 680n
R444 470K
R445 22k
C443 10n
C 444 68µ
GR412 BA 280
R468 2.2k
C442 2-18p
C445 10n
C447 68µ
R446 301k
LF Detector
BU401
IC 101:2
Ground U1
IC 102:2
L 412
C431 47µ
C433 10n
L 413
C432 47µ
C434 10n
GR419
BY164
IC408
C460 1000µ
GR423 BZX75/C7V4
C459 1000µ
C461 150µF
C462 150µF
T 101:5
T 101:7
BU402
L422
C464 10n
R435 1k
R434 22k
IC 406 74 LS 74
KT 401
T3404 2N5770
C425 4µ7
C427 5...65pF
PM 6664/02 only
IC 101:2
R141
IC 114:3
Ground Unit 1
C132

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Nederland: Philips Nederland B.V., Hoofdgroep PPS, Boschdijk 525, Gebouw VB, Eindhoven; tel. 793333

Ned. Antillen: Philips Antillana N.V., Postbus 523, Willemstad; Curaçao; tel. 37575–35464

New Zealand: Philips Electrical Industries of N.Z. Ltd., Scientific and Industrial Equipment Division Wakefield Street 181-195, P.O.B. 2097, Wellington; tel. 859–859

Nigeria: Philips (Nigeria) Ltd., 6 Ijora Causeway, P.O.B. 1921, Lagos; tel. 45414/7

Nippon: Nihon Philips Corporation, Shuwa Shinagawa Building, 26–33 Takanawa 3 – Chome, Minato-Ku, Tokyo 108; P.O. Box 13; tel. (03) 448–5574

Norge: Norsk A.S. Philips , Industri og Forsking, Essendrops gate 5, Postboks 5040, Oslo 3; tel. 463890

Österreich: Oesterreichische Philips Industrie GmbH, Abteilung Industrie Elektronik, Breitenfurterstrasse 219, A-1230 Wien; tel. (222)-831501/05

Pakistan: Philips Electrical Co. of Pakistan Ltd., El-Markaz, M.A. Jinnah Road, P.O.B. 7101, Karachi 3; tel. 70071

Paraguay: Philips del Paraguay S.A., Casilla de Correo 605, Asunción; tel. 48045-46919

Perù: Philips Peruana S.A., Apartado Aereo 1841, Lima 5; tel 326070

Philippines: Philips Industrial Development Inc , 2246 Pasong Tamo, P.O.B. 911, Makati Rizal D-708; tel. 889453 to 889456, 868951

Portugal: Philips Portuguesa S.A.R.L., Av. Eng.º Duarte Pacheco 6, Apartado 1331, Lisboa 1; tel 683121/9

Rwanda: Philips Rwanda S.A.R.L. B.P. 449, Kigali.

Saoudi Arabia: A. Rajab and A. Silsilah, P.O. Box 203, Jeddah - Saudi Arabia; tel. 27392/5

Schweiz-Suisse-Svizzera: Philips A.G., Binzstrasse 15, Postfach 307, Ch 8027 Zürich; tel. 442211

Singapore: Philips Singapore Private Ltd., P.O. Box 340, Toa Payoh Central Post Office; Singapore 12; tel. 538811

South Afrika: South African Philips (Pty) Ltd., P.O.B. 7703, 2 Herb Street, New Doornfontein, Johannesburg 2000; tel. 240531

South-Korea: Philips Electronics (Korea) Ltd., P.O. Box 3680, Seoul; tel. 737222

Suomi: Oy Philips Ab., Kaivokatu 8, P.O. Box 10255, 00101 Helsinki 10; tel. 17271

Sverige: Svenska A.B. Philips, Philips Industrielektronik, Lidingövägen 50, Fack, S10250 Stockholm; tel. 635000

Syria: Philips Moyen-Orient S.A., Rue Fardoss 79, Immeuble Kassas and Sadate, B.P. 2442, Damas; tel. 18605–21650

Taiwan: Philips Taiwan Ltd., San Min Building, P.O. Box 22978, Taipei

Tanzania: Philips (Tanzania) Ltd., Box 20104, Dar es Salaam; tel. 29571

Thailand: Philips Electrical Co. of Thailand Ltd., 283 Silom Road, P.O. Box 961, Bangkok; tel. 233-6330

Tunisia: S.T.I.E.T., 32815, Rue Ben Ghedhahem, Tunis; tel. 244268

Türkiye: Türk Philips Ticaret A.S., Posta Kutusa 504, Beyoglu, Gümüssüyü Caddesi 78/8 Istanbul 1; tel. 435910

Uganda: Philips Uganda Ltd., P.O. Box 5300, Kampala; tel. 59039

Uruguay: Industrias Philips del Uruguay S.A., Avda Uruguay 1287, Casilla de Correo 294, Montevideo; tel. 915641/44

U.S.A.: Philips Test and Measuring Instruments Inc., 85, Mc Kee Drive, Mahwah, New Jersey 07430, tel. (201) 529–3800

Venezuela: Industrias Venezolanas Philips S.A., Apartado Aereo 1167, Caracas 107; tel. 360511/363011/362255

Zaire: Philips S.Z.R.L., B.P. 1798, Kinshasa; tel. 31887-31888-31693-31208

Zambia: Philips Electrical Ltd., Professional Equipment Division, P.O.B. 553; Kitwe; tel. 2526/7/8

T&M/780501

For information on change of address:
N.V. Philips'Gloeilampenfabrieken
Test and Measuring Instruments Dept
Eindhoven The Netherlands

For countries not listed:
N.V. Philips S&I Export Dept
Test and Measuring Instruments Dept
Eindhoven - The Netherlands

CODING SYSTEM OF FAILURE REPORTING FOR QUALITY ASSESSMENT OF T & M INSTRUMENTS

(excl. potentiometric recorders)

The information contents of the coded failure description is necessary for our computerized processing of quality data.

Since the reporting of repair and maintenance routines must be complete and exact, we give you an example of a correctly filled-out PHILIPS SERVICE Job sheet.

① Country	② Day Month Year	③ Typenumber	/Version	④ Factory/Serial no.
32	150475	OPM	3260 02	DO 0783

CODED FAILURE DESCRIPTION ⑥

⑤ *Nature of call*

- [ ] Installation
- [ ] Pre sale repair
- [ ] Preventive maintenance
- [x] Corrective maintenance
- [ ] Other

Location	*Component/sequence no.*	*Category*
0021	TS0607	5
	R00631	2
	990001	4

⑦ *Job completed* [x]

Working time ⑧ 12 Hrs

Detailed description of the information to be entered in the various boxes:

①Country: 32 = Switzerland

②Day Month Year 150475 = 15 April 1975

③Type number/Version OPM3260 02 = Oscilloscope PM 3260, version 02 (in later oscilloscopes this number is placed in front of the serial no)

④Factory/Serial number DO0783 = DO 783 These data are mentioned on the type plate of the instrument

⑤ Nature of call: Enter a cross in the relevant box

⑥ Coded failure description

Location

These four boxes are used to isolate the problem area. Write the code of the part in which the fault occurs, e.g. unit no or mechanical item no of this part (refer to 'PARTS LISTS' in the manual).

Example: 0001 for Unit 1
000A for Unit A
0075 for item 75

If units are not numbered, do not fill in the four boxes; see Example Job sheet.

Component/sequence no.

These six boxes are intended to pinpoint the faulty component.

A. Enter the component designation as used in the circuit diagram. If the designation is alfa-numeric,the letters must be written (starting from the left) in the two left-hand boxes and the figures must be written (in such a way that the last digit occupies the right-most box) in the four right-hand boxes.

B. Parts not identified in the circuit diagram:

990000 Unknown/Not applicable
990001 Cabinet or rack (text plate, emblem, grip, rail, graticule, etc.)
990002 Knob (incl. dial knob, cap, etc.)
990003 Probe (only if attached to instrument)
990004 Leads and associated plugs
990005 Holder (valve,transistor, fuse, board, etc.)
990006 Complete unit (p.w. board, h.t. unit, etc.)
990007 Accessory (only those without type number)
990008 Documentation (manual, supplement, etc.)
990009 Foreign object
990099 Miscellaneous

Category

0 Unknown, not applicable (fault not present, intermittent or disappeared)
1 Software error
2 Readjustment
3 Electrical repair (wiring, solder joint, etc.)
4 Mechanical repair (polishing, filing, remachining, etc.)
5 Replacement (of transistor, resistor, etc.)
6 Cleaning and/or lubrication
7 Operator error
8 Missing items (on pre-sale test)
9 Environmental requirements are not met

⑦ Job completed: Enter a cross when the job has been completed.

⑧ Working time: Enter the total number of working hours spent in connection with the job (excluding travelling, waiting time, etc.), using the last box for tenths of hours.

12 = 1,2 working hours (1 h 12 min.)